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VOL. 69 NO. 48 ISSUE NO. 4166 1097-1114 NOVEMBER 30th, 1957

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(*Can. Jnl. Comp. Med. and Vet. Science*, 1957, 21, (5), 165.)

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Prednisolone in the Treatment of Bovine Ketosis

BY

R. A. PATERSON

Messrs. Pfizer Ltd., Folkestone

WHILE research during recent years has to some extent clarified our understanding of ketosis, the causes of primary ketosis are not yet perfectly understood. It is possible that factors both of an hereditary and environmental nature are involved ; factors which upset the normal endocrine balance between the anterior pituitary gland and the adrenal cortex. This imbalance renders the cow unable to meet the energy demands of high-level lactation, thus producing the characteristic symptoms of ketosis. It is almost certain that the ruminant absorbs little glucose as such, but is dependent upon the products of rumen fermentation for its energy needs. Of these products, only propionic acid may be reconverted to glucose. The resultant chronic shortage of glucose indicates that the stress which the ketotic animal suffers is in fact a shortage of glucose.

A rational explanation for the development of primary ketosis might be as follows :

(1) The cow characteristically has a low carbohydrate reserve as is typified by the normal blood-sugar level of only 50 to 60 mg. per cent. (other species—non-ruminant—characteristically measure 80 to 100 mg. per cent.), and low liver glycogen content.

(2) The normal cow derives much of her energy from short-chain fatty acids, products of rumen digestion. The 3 primary acids produced are acetic, propionic and butyric ; only propionic being a direct precursor of carbohydrate substances.

(3) In periods of high energy demand, such as the initiation of relatively high-level milk production, the total required energy may be excessive to the food-intake. The minimal carbohydrate reserve then forces the cow to draw on stored body fat as a supplemental energy source. The stored body fat when excessively mobilised produces ketone-bodies (aceto-acetic acid, beta-hydroxybutyric acid, and acetone) above utilisation level and they therefore accumulate in the blood stream.

(4) The reduced blood-sugar level and the increased ketone body concentration cause a "toxic" reaction in the animal that depresses the appetite, thus further aggravating the condition.

(5) The cow's innate response is to decrease energy demand which is accomplished by the cessation of lactation. If untreated, most ketotic cows will survive but seldom attain high-level milk production during the lactation cycle.

(6) The underlying cause of ketosis may well be the failure of the adrenal cortex to secrete certain hormones that have the ability to promote conversion of non-carbohydrate materials into blood-glucose during the high energy demand period.

The cause of adrenal cortical failure at the critical time is due to exhaustion owing to previous stress conditions such as parturition and other undefined factors.

One approach in the treatment of ketosis has been the attempt by a number of workers to find glucogenic substances which may be given orally and which are not destroyed by rumen micro-organisms. Glycerol, sodium propionate and ammonium lactate have shown some promise, though the results have been variable. Johnson (1954), among others, has reported on the use of glycerol and propylene glycol. In an evaluation of different treatments he indicates that propylene glycol is the most acceptable. Used at recommended levels (200 to 400 g. twice daily by drench) there were no undesirable reactions and substantial quantities of glucose were provided.

Adrenocorticotrophic hormone (ACTH) and a number of glucocorticoids have been used for the treatment of bovine ketosis. The efficacy of cortisone and ACTH has been demonstrated by Shaw *et al.* (1952), Dye *et al.* 1953), McAuliff *et al.* (1954) and

Shaw *et al.* (1955); hydrocortisone by Shaw *et al.* (1954) and prednisone by Morris and Hall (1956) and by Shaw (1956).

Research carried out by the Pfizer organisation is largely concerned with the use of cortical hormones as therapeutic agents. It is designed on the basis of replacing deficient adrenal cortex hormone, thus correcting early symptomatology before it becomes aggravated, and simultaneously promoting recovery of the exhausted endocrine gland by allowing rest. It has been found that hydrocortisone possesses greater activity than cortisone, single administration resulting in recovery in the majority of cases treated. With the development of Deltacortril* (prednisolone)—a derivative of hydrocortisone—it became desirable to investigate the efficacy of this steroid in the treatment of bovine ketosis.

With excellent co-operation from over 40 veterinary surgeons it has been possible to present the following analysis of a clinical evaluation of prednisolone throughout the United Kingdom.

Experimental Methods

Data is presented for a total of 230 cows diagnosed as having ketosis, and this total includes every animal for which adequate information was available. These cases have been divided into 2 groups; those in which clinical diagnosis was substantiated by estimation of blood-ketones at the time of treatment (Table I); and those in which diagnosis was arrived at on clinical symptoms only (Table II).

A single initial dosage rate of 10 c.c. Deltacortril aqueous suspension (containing 100 mg. prednisolone) was advised in all cases, irrespective of size of animal or severity of case. With few exceptions this recommendation was adhered to. The suspension is administered by intramuscular injection.

Results†

Of the 75 cases (73 cows) in which diagnosis was confirmed by blood examination (Table I), 57 (over 76 per cent.) recovered following a single administration of 100 mg. prednisolone and without additional treatment of any kind. In the majority of cases "immediate recovery" was secured, i.e., appetite and milk yield had definitely improved within 24 hours, the animal being apparently normal within a few days. One cow received 150 mg. prednisolone at the outset, and 200 mg. after 24 hours, recovery following. Five cows had additional administration of prednisolone as follows: (i) 200 mg. after 24 hours; (ii) 100 mg. after 48 hours; (iii) 100 mg. after 72 hours; (iv) 100 mg. after 48 hours; (v) 100 mg. after 24 hours. All of these cases recovered uneventfully without further, or additional treatment. A total of 63 cows, therefore, recovered without relapse (84 per cent.).

Five cows relapsed after periods of 2 weeks, 10 days, 3 days, 6 days and 10 days respectively; 4 of these gave a sustained recovery following re-treatment with prednisolone, and the fifth responded, but not so well as to the first treatment. Seven cases gave either no response, or one so slight that other therapy had to be employed.

As observed by previous workers, there was no correlation between the degree of ketonaemia and the severity of the symptoms. In the majority of cases, prednisolone therapy was followed by a fairly rapid reduction of blood-ketone values, In 4 cases ketone levels had increased at 24 to 48 hours after administration, but clinically the animals had improved in each case. From the comments of many of the clinicians concerned, a marked improvement in appetite and milk yield occurs even before the ketonaemia is eliminated.

In an additional series of cases data on both blood-sugar and blood-ketone values at the time of, and 24 hours after, treatment was available. This indicates that in a high proportion of typical cases the blood-sugar values are already returned to the normal range 24 hours after treatment with prednisolone. Individual case-histories were not available for these animals, and they have therefore been excluded from the general analysis. In 9 cases, however, in which blood sugar estimations were carried out, there was a very rapid rise in the blood sugar level following treatment with prednisolone.

In the second group of animals (Table II), in which diagnosis was not confirmed by blood examination, 112 (over 67 per cent.) out of a total of 165 cases gave an immediate sustained recovery to 100 mg. prednisolone as the only treatment, while one case responded to 80 mg. Twenty cases required a second, and one of these a third, administration of 100 mg. prednisolone. An additional 15 cases relapsed following initial recovery at periods varying up to 4 weeks; in 11 of these cases a sustained recovery was obtained following re-treatment with prednisolone. Thus a total of 144 (over 87 per cent.) recovered when prednisolone was the only therapy employed. Seven animals treated with the steroid had a variety of supportive treatments from the outset, and these cases recovered uneventfully. Ten cases showed either very little response, or no response

TABLE I
CASES IN WHICH DIAGNOSIS WAS CONFIRMED BY EXAMINATION OF BLOOD

Result of treatment	No. of cases	Approximate percentages	
Sustained recovery after 100 mg.	57	76	
Sustained recovery after 100 mg. + 100 mg.	4	5·33	
Sustained recovery after 100 mg. + 200 mg.	1	1·33	89·32 recovered
Sustained recovery after 150 mg. + 200 mg.	1	1·33	
Relapsed and recovered after second 100 mg. injection ...	4	5·33	
Relapsed and did not recover after second 100 mg. injection ...	1	1·33	10·66 did not recover
No response	7	9·33	
Total number of cases treated ...	75	100	100

* Deltacortril is the Pfizer trade mark for prednisolone.

† Tables giving full information on individual cases treated were submitted for publication but could not be included in the printed work because of lack of space. The detailed tables may be obtained on application to the author.—EDITOR.

TABLE II

CASES IN WHICH CLINICAL DIAGNOSIS WAS NOT CONFIRMED BY EXAMINATION OF BLOOD

Result of treatment	Number of cases		Approximate percentages	
Sustained recovery after 100 mg.	112	67·88		
Sustained recovery after 100 mg. + 100 mg.	19	11·52		
Sustained recovery after 100 mg. + 100 mg. + 100 mg.	1	0·61	87·27 recovered with Deltacortril as the only treatment	
Sustained recovery after 80 mg.	1	0·61		91·52 recovered
Relapsed after 80 mg.—recovered after second 80 mg.	3	1·82		
Relapsed after 100 mg.—recovered after second 100 mg.	8	4·85		
Recovered after 80 mg. + supportive treatment	1	0·61		
Recovered after 100 mg. + supportive treatment	5	3·03	4·24 recovered with Deltacortril + supportive treatment	
Recovered after 100 mg. + 100 mg. + supportive treatment	1	0·61		
Relapsed and did not recover after second injection	4	2·36		
No response	10	6·06	8·48 did not recover	
Total number cases treated	165	100	100	100

TABLE III

SUMMARY OF CASES TREATED

Result of treatment	Number of cases		Approximate percentages	
Sustained recovery after 100 mg.	169	70·42		
Sustained recovery after 100 mg. + 100 mg.	23	9·58		
Sustained recovery after 100 mg. + 100 mg. + 100 mg.	1	0·42	87·92 recovered with Deltacortril as the only treatment	
Sustained recovery after 100 mg. + 200 mg.	1	0·42		
Sustained recovery after 150 mg. + 200 mg.	1	0·42		90·83 recovered
Sustained recovery after 80 mg.	1	0·42		
Relapsed after 80 mg.—recovered after second 80 mg.	3	1·25		
Relapsed after 100 mg.—recovered after second 100 mg.	12	5		
Recovered after 80 mg. + supportive treatment	1	0·42		
Recovered after 100 mg. + supportive treatment	5	2·08	2·92 recovered with Deltacortril + supportive treatment	
Recovered after 100 mg. + 100 mg. + supportive treatment	1	0·42		
Relapsed and did not recover after repeat dosage	5	2·08		
No response	17	7·08	9·17 did not recover	
Total number of cases treated	240	100	100	100

at all, to treatment with prednisolone ; several of these had previously failed to respond to a variety of other treatments.

Side Effects

In a few of the treated cows there occurred mild diarrhoea within 24 hours of treatment, in one case diarrhoea was severe. All were cows which responded to prednisolone therapy, and the diarrhoea was controlled without difficulty. The only other apparent side effects occurred in 2 cases, both from the same herd, which exhibited the same symptoms (inco-ordination and restlessness) within 36 hours of treatment. Prednisolone therapy was not repeated and one cow made a slow recovery. The other died after 72 hours, and *post-mortem* examination revealed a pulpy condition

A Cineradiographic Study of the Teat Sinus During Suckling in the Goat

BY

G. M. ARDRAN, A. T. COWIE and F. H. KEMP

The Nuffield Institute for Medical Research, University of Oxford, and The National Institute for Research in Dairying, Shinfield, Reading

MANY aspects of the mechanism of suckling are still imperfectly understood. No observations have been published of the changes in form of the lumen of the mammary ducts in man or the teat sinuses in animals during suckling. This paper describes a cineradiographic study of suckling in the goat in which part of the contents of the udder were replaced with barium sulphate suspension so as to render the milk opaque to X-rays.

Method

The teat of ½ of the udder of a healthy lactating British Saanen goat was cannulated. A quantity of milk was allowed to escape and an equal amount of sterile barium sulphate suspension was injected, the object being to produce a concentration of approximately 25 per cent. of barium sulphate in the milk contained in the udder and teat cisterns. The goat and the kid were placed in front of the X-ray cinecamera (Ardran & Wyatt, 1957) so that the kid's head was in position for lateral projection when suckling was established. A series of 35-mm. cineradiographs was taken at 25 and 50 frames per second.

Three kids were examined.

Results

Before feeding began the goat's teat had the form shown in Fig. 1. When feeding was established the barium milk suspension contained in the teat sinuses showed that the teat had been elongated (Fig. 2), the apex of the teat reaching backwards into the kid's mouth as far as the level of the posterior limit of the long diastema.

When the kid's lower jaw was raised the teat was compressed between the tongue and the palate and its lumen was narrowed ; the forepart of the tongue was

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Prednisolone in the Treatment of Bovine Ketosis.—*Concluded.*

of the kidneys not unlike pulpy kidney disease in sheep. It is not known to what extent any of these occurrences were associated with prednisolone therapy, but it can be stated that the incidence of side effects was negligible.

Discussion

The fact that a high percentage of cows treated with 100 mg. prednisolone responded satisfactorily indicates that this dosage rate is adequate. It may be that the smaller breeds, or the less severely affected, would require smaller dosage ; but it is probable that the general adoption of the 100 mg. dosage level will obviate the necessity for a considerable number of repeat visits.

The established greater biological activity of prednisolone over cortisone and hydrocortisone gave promise that prednisolone would be effective therapy for primary bovine ketosis at markedly lower dosage rates than the other glucocorticoids. This promise has been confirmed by the present investigation. While this evaluation was in progress Link *et al.* (1957) published the first report on the use of prednisolone in bovine ketosis, the results being in every way comparable to those outlined above.

It will be realised that all treatments for ketosis serve only to correct the physiological derangement temporarily. If, after the recovery of appetite, the rate at which glucose is used is still greater than the rate of its availability, the animal suffers a relapse when treatment is discontinued.

What has been stated here refers to primary ketosis. Good results in ketosis therapy cannot be expected if the ketosis is complicated by, or secondary to, other disease conditions, grossly inadequate energy intake, or other severe systemic abnormalities. The high percentage of recoveries resulting from prednisolone therapy in this investigation implies that a high degree of skill exists in the clinical diagnosis of primary bovine ketosis.

Conclusions

Prednisolone (Deltacortril) is effective treatment for primary bovine ketosis in a very high percentage of cases. The satisfactory dosage level (about 100 mg.) is much smaller than that recorded for other glucocorticoids.

A very small percentage of cases relapsed following initial prednisolone therapy, and the occurrence of side effects attributable to the steroid was negligible.

The preparation of prednisolone employed was characterised by rapid physiological effect and ease of administration.

Acknowledgments.—The author wishes to place on record his appreciation of the willing co-operation received from the clinicians concerned.

He also thanks the Directors of Messrs. Pfizer Ltd. for their permission to publish this report.

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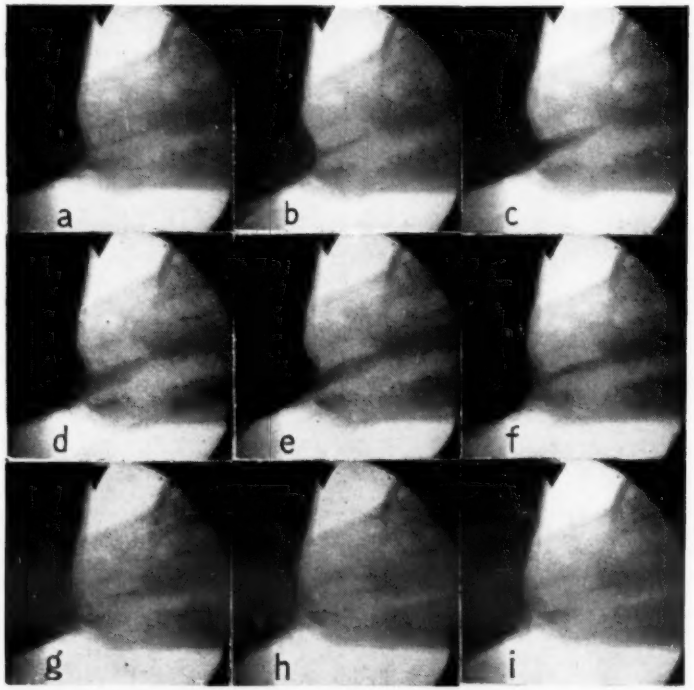


FIG. 2.—Consecutive prints from a cineradiographic film of a kid feeding from the udder taken at 50 frames per second.

(a) A trace of barium contrast medium extending from the incisor to the premolar teeth indicates the narrowed lumen of the teat. At this stage the mandible and tongue are being lowered to allow refilling of the teat.

(b and c) Further refilling of the teat.

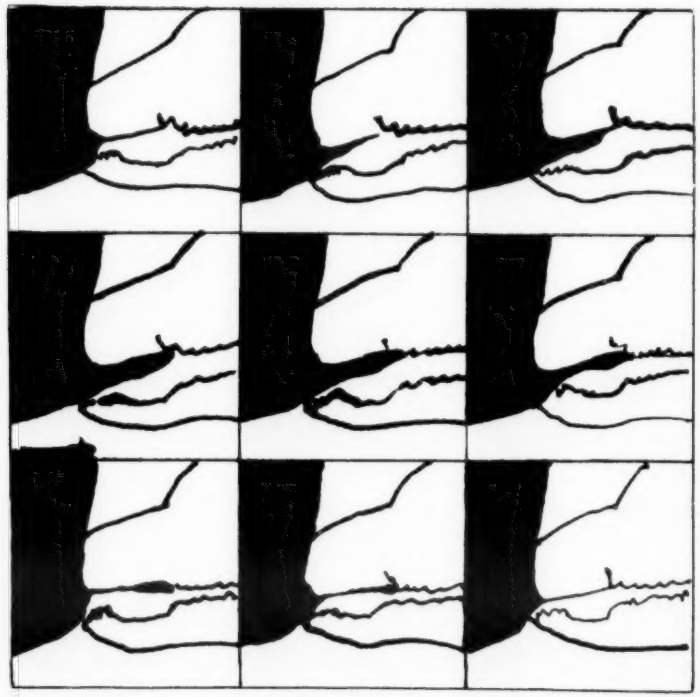
(d) The teat fully expanded. Note the indentations produced on the lower surface of the teat by the tongue.

(e) The tongue in the region of the upper cheek teeth is being lowered: at this stage the original film showed some contrast medium entering the mouth, but in the print this is obliterated by the shadow of the superimposed upper teeth.

(f) Elevation of the lower jaw and the tip of the tongue with narrowing of the neck of the teat. Further lowering of the tongue in the region of the cheek teeth.

(g and h) The elevation of the forepart of the tongue has occluded the neck of the teat and the contents of the teat are being expressed into the back of the mouth.

(i) The final phase of expression. Three frames later the teat was ready to refill as in Fig 2 (a).



Tracing from Fig. 2 showing the black barium filled udder and teat to the left: the upper and lower jaws have been outlined. For details see legend to Fig. 2

FIG. 1.—A photograph of the udder of the goat showing the shape of the teat.

also raised from the floor of the mouth producing an indentation in the lower surface of the teat, which spread from before backwards. By this means the lumen of the neck of the teat was obliterated and most of the contents was displaced into the back of the mouth, where it accumulated between the tongue and the palate. As the wave of upward movement of the tongue continued backwards the tongue came in contact with the hard palate beyond the tip of the teat, displacing the contents of the mouth backwards into the pharynx, where they were swallowed ; only a very small residue was left on the tongue immediately behind the end of the teat.

While the first mouthful was being displaced into the pharynx the jaw was lowered and the forepart of the tongue was also lowered from before backwards in the floor of the mouth : the teat was progressively refilled with milk as the tongue was depressed : when the tongue was depressed beyond the tip of the teat, barium passed from the teat into the mouth. The tongue continued to be lowered and barium milk suspension continued to pass into the mouth until the teat sinus had been stripped by elevation of the lower jaw and the forepart of the tongue in the next cycle of movement. The mode of swallowing was similar to that described in kid goats feeding from a bottle (Ardran, Kemp & Lind, 1958a).

Discussion

The appearances described above are similar to those seen when the kid goat is taking milk from a bottle through a soft rubber veterinary teat : the lumen of the teat sinus, when it is in the kid's mouth, resembles in size and shape the bulb of the rubber teat (Ardran, Kemp & Lind, 1958a).

The walls of the soft rubber teats supplied for feeding animals seem to be similar in consistency to the tissues comprising the walls of the teat sinus in the goat, whereas the hard rubber teats also supplied for veterinary work could not possibly behave in this manner.

We have not recorded the pressures inside and outside the teat sinus simultaneously with the cineradiography while the kid was suckling. Such recordings have been made while kids and lambs have been feeding from a bottle (Ardran & Kemp, 1958). In those animals in which the lumen of the neck of the teat was virtually obliterated pressures have been recorded inside the teat in this region of up to 250 mm. mercury ; when the animal was feeding well pressures varying from atmospheric to minus 150 to 200 mm. mercury have been recorded in the mouth at the tip of the teat ; the maximum negative pressure in the mouth coincides with the maximum positive pressure in the teat. In view of the similarity of the appearances of the tongue and teat as seen by cineradiography, there would seem to be little doubt that similar pressure relationships occur when the kid is feeding from the udder. If the lumen of the neck of the teat is not obliterated, a significant positive pressure cannot be generated inside the teat, and thus the pressure drop from inside to outside the teat is considerably reduced.

We have previously shown (Ardran, Kemp & Lind, 1958a) that most human babies find difficulty in obliterating the lumen of the neck of the teat when feeding on the bottle because the teat is usually of too rigid a material, and thus feeding is relatively inefficient since the advantages of positive pressure are not obtained.

The change in form of the goat's teat when in the kid's mouth during suckling its analogous to the change in form of the human nipple when it is in the baby's mouth (Ardran, Kemp & Lind, 1958b).

Studies on the changes in form of the cow's teat when milked by milking machine will be published separately (Ardran, Dodd & Kemp).

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V.V.B.F. LADIES' GUILD FOR THE S.E. MIDLANDS AREA

The wives of members of the South-East Midlands Association held a subscription cocktail party to mark the formation of a Ladies' Guild in the area.

Mr. Gordon kindly loaned Chapel Brampton House for the occasion, and the President of the Guild, Mrs. Lamont, received some 70 members and their guests.

Everyone enjoyed a very pleasant evening, and the sum of £25 was raised for the Victoria Veterinary Benevolent Fund.

The Control of Fowl Typhoid in the Field by the Use of Live Vaccines

BY

J. F. HARBOURNE

Ministry of Agriculture, Fisheries and Food, Veterinary Investigation Centre, Leeds

SUMMARY.—1. Field trials were undertaken to assess the value of 2 live attenuated vaccines, 1 a rough strain of S. gallinarum *(9R) and 1 a smooth strain (9S) as a means of preventing and controlling fowl typhoid.*

2. Preventive vaccinations were performed at 43 farms; one-third of the birds of each flock received 1 ml. of vaccine 9R subcutaneously, one-third 0·2 ml. of vaccine 9S subcutaneously and the remaining one-third were left unvaccinated.

3. In 18 flocks where losses from fowl typhoid were slight, 0·9 per cent. of the deaths occurred in birds vaccinated with 9R, 0·4 per cent. in birds vaccinated with 9S and 2·4 per cent. in unvaccinated controls.

4. At 7 of the farms where losses from fowl typhoid were appreciable, after the first 14 days from the start of the trial 1 per cent. of the birds vaccinated with 9R died from fowl typhoid, 1·7 per cent. vaccinated with 9S and 11 per cent. of the unvaccinated birds.

5. At two of the farms the survivors were killed after blood testing. A smooth strain of S. gallinarum *was recovered from a high proportion of the birds in each of the 3 groups.*

6. In 5 flocks where fowl typhoid had previously been diagnosed, two-thirds of the birds of each flock received 1 ml. of vaccine 9R subcutaneously ; the remaining third were left unvaccinated. Significant losses from fowl typhoid occurred at 2 farms. At 1 of these farms vaccination apparently precipitated death. At the other, 5 per cent. of the vaccinated birds and 39 per cent. of the unvaccinated birds died from fowl typhoid.

7. It is suggested that treatment with furazolidone followed by vaccination might be a useful procedure in flocks where an early diagnosis of fowl typhoid is made.

WILLIAMS SMITH (1955) reported that when chickens were treated early with furazolidone after oral dosing with *Salmonella gallinarum*, such birds developed very little immunity, as evidenced by their lack of production of agglutinins and their susceptibility to reinfection. Harbourne and Sellers (1955) came to the same conclusion after treating field outbreaks of fowl typhoid with the same drug, but suggested that prompt treatment would reduce losses appreciably. Later work by Wilson (1956) and Harbourne (1956) showed that furazolidone was not entirely successful in eliminating *S. gallinarum* infection from chronic carriers of the disease.

The control of fowl typhoid by the use of furazolidone alone has therefore two inherent disadvantages, namely the possibility of reinfection of early treated cases and the inability of the drug regularly to eliminate *S. gallinarum* infection from chronically infected birds.

Wilson (1946) reported that a live attenuated culture of *S. gallinarum* provided a solid and lasting immunity, but did not advocate its general use in the field owing to the possibility of enhancement of its virulence. Dead vaccines have proved of little value (Wilson, 1946, 1956, Hall *et al.* 1949). Williams Smith (1955) having found that naturally recovered chickens were completely immune to experimental reinfection decided to reinvestigate the production of immunity to *S. gallinarum* infection by the use of vaccines. He produced two attenuated live vaccines, one smooth (9S) and one rough (9R) ; both were very effective in preventing experimental infection. Neither vaccine was lethal for chickens at 5 to 12 weeks of age or for laying hens, but when vaccine 9S was employed in the latter, egg production was severely affected. Vaccine 9R did not produce demonstrable agglutinins against smooth *S. gallinarum* in chickens and was avirulent for day-old chicks. In contrast, vaccine 9S was both lethal for day-old chicks and was agglutinogenic. Satisfactory immunity lasted 12 weeks when vaccine 9R was employed in 7-week-old chickens ; after this time it commenced to wane. It was of a higher order when vaccine 9S was used except that there was a slight reduction in the vaccine's protective powers during the active laying period.

Both vaccines were employed as 24-hour broth cultures and the amount administered was 1 ml. subcutaneously in each case ; later only 0·2 ml. of vaccine 9S was found to be necessary.

During the course of the experiments, an immunity of the interference type was noted when either vaccine was employed. This interference immunity still occurred even in chickens injected with 9S two days after previous oral infection with a virulent strain of *S. gallinarum* (Williams Smith, 1956).

Because of these very promising findings it was decided to undertake a series of field trials. Both types of vaccine were used prophylactically and one of them (9R) in the early stages of outbreaks to see whether the interference effect operated under field conditions.

Material and Methods

Calculations based on previous trials indicated that about 50 flocks would be required for a satisfactory vaccination trial, taking into account that no outbreaks of fowl typhoid were likely to occur on a number of the farms, even in a district where the disease was known to exist (Leech, 1956). In fact 46 flocks on 43 farms where outbreaks had occurred the previous year were brought into the trial and in addition, vaccination was performed at five farms during the course of fowl typhoid outbreaks.

Owners participating in the trial agreed that no drugs or other vaccines were to be given to the

birds in the experimental groups while the trial was in progress, and that all birds in the experimental groups which died during the trial would be submitted to the laboratory for *post-mortem* examination. Most of the birds were vaccinated when they were 16 weeks of age, although some were as young as 10 weeks and others were as old as 20 weeks.

The birds in each flock were divided into 3 equal groups. The birds of the first group received 1 ml. of a 24-hour broth culture of vaccine 9R subcutaneously, the birds of the second group received 0·2 ml. of vaccine 9S subcutaneously and the third group were left unvaccinated. All the birds were provided with numbered leg and wing bands for identification purposes, since there was no separation of the groups.

When dead birds were received at the laboratory a routine *post-mortem* examination was carried out to ascertain the cause of death and in every case a direct culture was made from the liver on to an agar slope. After incubation for 18 hours at 37° C. the slope was then examined for the presence of *S. gallinarum*. Where the rough strain (9R) was suspected, an acriflavine test (Brown & Bonestell, 1947) was employed, together with a biochemical examination. No attempt was made to differentiate between a field strain of *S. gallinarum* and the smooth vaccine 9S, since this would have required a protracted biological assay. Birds were regarded as having died from fowl typhoid when the typical disease lesions were found and *S. gallinarum* was isolated.

Vaccinations started in April, 1956, and were completed in September, 1956. The trials were brought to a close on December 31st, 1956, when no more carcases were accepted.

The survivors from 2 outbreaks were purchased and slaughtered 4 months and 5 months respectively after vaccination. Before slaughter the birds were blood-tested by the rapid method, and cloacal swabs taken and examined for *S. gallinarum*. The following organs were then examined for the presence of *S. gallinarum*, using an enrichment technique :—heart, liver, ovary and duodenum.

At 5 farms where vaccination was performed during the course of an outbreak arrangements as regards treatment and the submission of carcases to the laboratory were the same as for the preventive vaccinations. On these farms two-thirds of the flock received 1 ml. of the rough vaccine (9R) subcutaneously and the remaining one-third were left unvaccinated. The smooth vaccine (9S) was not employed since the majority of the birds were in lay. Vaccinations were performed during the months of September and October, 1956, and these trials also were concluded on December 31st, 1956.

Results

1.—*Preventive Vaccination*

The average age of the birds at the time of vaccination was 4 months. The majority were kept on free range, though a few were maintained on deep litter. A total of 3,162 birds were vaccinated with the rough vaccine (9R), 3,036 birds with the smooth vaccine (9S) and 2,717 birds were left unvaccinated. The general opinion was that the vaccine had no deleterious effects, but 6 farms reported a check in their birds after vaccination and egg production was said to be poor on another 6 occasions. In these latter cases the vaccines were not held to be solely responsible.

Fowl typhoid was diagnosed in birds from 25 of the farms. At 18 of the farms, however, the average number of birds which died was less than 3. In addition fowl typhoid was reported to have been present on 21 of the farms in birds not included in the trial. At 15 of these farms there was every opportunity for contact between them and the trial groups. There were no losses in the trial groups on two of the farms despite previous contact with birds suffering from acute fowl typhoid.

A summary of the results, excluding those farms where fowl typhoid was not diagnosed, is given in Table I.

TABLE I

DEATHS FROM FOWL TYPHOID (25 FARMS)

Trial group	Number of birds	Deaths from fowl typhoid
Vaccinated 9R ...	1,976	*24 (1·2 per cent.)
Vaccinated 9S ...	1,923	20 (1·0 „)
Unvaccinated ...	1,755	93 (5·3 „)

* On four occasions a rough strain of *S. gallinarum* was recovered from birds showing lesions of visceral lymphomatosis. These are not included in the table since they had obviously died from this condition and not from fowl typhoid.

It will be seen that the number of deaths from fowl typhoid was more than 4 times as great in the unvaccinated group as in either of the 2 vaccinated ones. A detailed study of the results, however, indicates that in some flocks vaccination was inadvertently performed in the early stages of an outbreak and that the act of vaccination precipitated deaths from fowl typhoid.

Tables II and III summarise respectively the results obtained at the 18 farms where losses were few and at the 7 farms where the losses were relatively heavy.

Seven of the 12 birds vaccinated with 9R and all 5 birds vaccinated with 9S died in the first month after vaccination. In the unvaccinated group, 29 birds died

TABLE II

DEATHS FROM FOWL TYPHOID (18 FARMS)

Trial group	Number of birds	Deaths (time in weeks) after vaccination								Total deaths
		1–2	3–4	5–8	9–12	13–16	17–20	21–24	25–26	
Vaccinated 9R	1,352	4	3	2	1	–	1	1	–	12 (0·9 per cent.)
Vaccinated 9S	1,318	4	1	–	–	–	–	–	–	5 (0·4 „)
Unvaccinated	1,193	1	1	11	2	3	8	1	2	29 (2·4 „)

TABLE III
DEATHS FROM FOWL TYPHOID (7 FARMS)

Trial group	Number of birds	Deaths (time in weeks) after vaccination								Total deaths
		1–2	3–4	5–8	9–12	13–16	17–20	21–24	25–26	
Vaccinated 9R	624	6	–	1	1	2	2	–	–	12 (1·9 per cent.)
Vaccinated 9S	605	5	1	1	–	2	4	1	1	15 (2·5 „)
Unvaccinated	562	4	19	20	4	8	8	–	1	64 (11·4 „)

from fowl typhoid, only 2 of which died during the first month of the trial.

In the first fortnight after vaccination, 6 birds died in the 9R vaccinated group, 5 in the 9S vaccinated group and 4 in the unvaccinated controls. After this time 6 birds in the 9R vaccinated group died from fowl typhoid, 10 in the 9S vaccinated group and 60 in the unvaccinated controls.

2.—*Slaughter of survivors at two farms*

Farm 1.—The trial group consisted of 73 Light Sussex × R.I.R. pullets and at the time of vaccination they were approximately 5 months old. There was every indication that vaccination was performed at the start of an outbreak of fowl typhoid since one bird died on the day of vaccination and was found to be suffering from the disease. There were 25 birds in each of the vaccinated groups and 23 birds were left unvaccinated. The birds were kept on free range throughout the period of the trial.

A summary of deaths, in days, after vaccination is given in Table IV and includes only those birds which were submitted to the laboratory for *post-mortem* examination.

The survivors, consisting of 23 birds vaccinated with vaccine 9R, 19 vaccinated with 9S and 5 unvaccinated birds, were slaughtered 4 months after the beginning of the trial. Cloacal swabs taken at the time of death were negative for *S. gallinarum* despite the employment of an enrichment technique.

The results of the bacteriological examinations for the presence of smooth *S. gallinarum* and the rapid blood tests are recorded in Table V.

Distorted ovules or diseased ovaries were found in 6 of the birds vaccinated with 9R, although one bird proved to be negative both to the rapid blood test and on bacteriological examination of the organs. One of the 6 birds showed chronic heart lesions and *S. gallinarum* was isolated from this site.

Similarly, 6 of the birds vaccinated with 9S showed ovarian lesions, though in this case 2 of the birds were negative both to the blood test and on culture.

One unvaccinated bird had a degenerated ovary. In no case was a rough strain of *S. gallinarum* recovered.

Of the original 73 birds in the trial, 2 birds vaccinated with 9S and 7 unvaccinated birds were not received for *post-mortem* examination ; they were said by the owner to have been killed by foxes which were active in the neighbourhood. He also stated that there had been no check in the birds at the time of vaccination and that egg production was good until just before slaughter, when it had gone down slightly.

Farm 2.—The trial group consisted of 67 Black Leghorns × R.I.R. pullets aged 5 months at the time of vaccination. Twenty birds were vaccinated with vaccine 9R, 25 with vaccine 9S and 22 birds were unvaccinated. They were kept on free range throughout most of the trial period, but were introduced to a deep litter house three

TABLE IV
DEATHS FROM FOWL TYPHOID—FARM 1

Trial group	Number of birds	Deaths (time in days) from Fowl Typhoid										Total deaths
		4	7	10	12	14	16	18	22	23	37	
Vaccinated 9R	25	–	1	–	–	1	–	–	–	–	–	2 (8 per cent.)
Vaccinated 9S	25	2	–	–	–	–	–	–	–	–	1	3 (12 „)
Unvaccinated	23	–	–	1	1	–	1	1	3	3	1	11 (48 „)

TABLE V
BLOOD TESTS AND BACTERIOLOGICAL FINDINGS—SURVIVORS—FARM 1

Trial group	Number examined	Number Negative culture Positive blood test	Number Positive culture Negative blood test	Number Positive culture Positive blood test	Total positive
Vaccinated 9R	23	3	5	5	13 (57 per cent.)
Vaccinated 9S	19	1	1	9	11 (58 „)
Unvaccinated	5	2	2	1	5 (100 „)

TABLE VI
DEATHS FROM FOWL TYPHOID—FARM 2

Trial group	Number of birds	Deaths (time in days) from Fowl Typhoid—Farm 2						
		6	7	41	46	94	168	Total deaths
Vaccinated 9R	20	–	–	–	1	–	–	1 (5 per cent.)
Vaccinated 9S	25	–	1	–	–	–	–	1 (4 „)
Unvaccinated	22	1	–	1	–	1	1	4 (18 „)

TABLE VII
BLOOD TESTS AND BACTERIOLOGICAL FINDINGS—SURVIVORS—FARM 2

Trial group	Number examined	Number Negative culture Positive blood test	Number Positive culture Negative blood test	Number Positive culture Positive blood test	Total positive
Vaccinated 9R	14	1	3	1	5 (36 per cent.)
Vaccinated 9S	22	2	0	4	6 (27 „)
Unvaccinated	15	0	4	3	7 (47 „)

weeks before slaughter. A summary of deaths in days after vaccination is given in Table VI and includes only those birds which were submitted to the laboratory for *post-mortem* examination.

At the time of slaughter the survivors were 10 months old. *Post-mortem* examinations were performed on 14 birds vaccinated with 9R, 22 vaccinated with 9S and 15 unvaccinated birds, a total of 51. Eight birds were excluded since they had lost their identification bands and 2 birds had died from other causes.

As was the case in Farm 1, all cloacal swabs were negative for *S. gallinarum*.

The results of the blood tests and bacteriological findings for the 51 survivors are summarised in Table VII.

One bird in the group vaccinated with 9R from which *S. gallinarum* was isolated but was negative to the blood test, also showed lesions of visceral lymphomatosis. Three of the birds vaccinated with 9S showed pathological changes in the ovaries, one of which was negative to the blood test and also proved negative on culture. Five of the unvaccinated birds had diseased ovaries. *S. gallinarum* was not isolated from one of these birds and it was also negative to the blood test. A rough strain of *S. gallinarum* was not isolated from any of the birds. The owner stated that the birds had not suffered a check at the time of vaccination, but that the egg production had been poor.

3.—*Vaccination at Outbreaks*

Vaccination was performed at 5 farms, but appreciable losses from fowl typhoid only occurred at 2 of them.

The results obtained at these 2 farms are recorded below :—

(*a*) *Farm A.*—The outbreak occurred in a group of Light Sussex × Brown Leghorn hens aged 16 months. They were housed in a loft and management was poor. Seventy-four birds were vaccinated with vaccine 9R and 36 birds were left unvaccinated. The number of birds which died before the trial started was estimated to be 40 spread over 5 days. After the trial commenced, 22 vaccinated and 13 unvaccinated birds died from fowl typhoid (Table VIII) and either tuberculosis or visceral lymphomatosis accounted for the deaths of 9 other birds received for *post-mortem* examination.

Although the percentage death rate from fowl typhoid is approximately the same in each group, by far the greater number of vaccinated birds died in the first week after vaccination. Thus 17 vaccinated birds died during this period and only 5 after this time. The comparable figures for the unvaccinated group were 4 and 9 respectively. The owner stated that there was a check after vaccination and no eggs were gathered, although egg production had been poor before the trial started.

(*b*) *Farm B.*—Vaccination was performed in a mixed flock of pullets and hens, both of the same hybrid strain. Fowl typhoid was first diagnosed in the hens, and during the month preceding vaccination, 20 died. Five pullets had also died. At the time of vaccination the hens were 19 months old and the pullets 6 months. Both groups were housed in huts in the same field and they were kept as one flock. The hygiene was reasonably

TABLE VIII
DEATHS FROM FOWL TYPHOID—FARM A

Trial Group	Number of birds	Deaths (time in weeks) from Fowl Typhoid								
		1	2	3	4	5	6	7	12	Total deaths
Vaccinated 9R	74	17	–	2	1	1	–	–	1	22 (30 per cent.)
Unvaccinated	36	4	1	2	1	2	1	1	1	13 (31 „)

TABLE IX
DEATHS FROM FOWL TYPHOID—FARM B

Trial group	Number of birds	Deaths (time in weeks) from Fowl Typhoid							Total deaths
		1	2	3	4	5	7	9	
Vaccinated 9R	129	1	2	–	1	3	–	–	7 (5 per cent.)
Unvaccinated	68	1	8	7	5	4	1	1	27 (39 „)

good. Seventy-three hens and 56 pullets were vaccinated with 9R and 44 of the former and 24 of the latter were left unvaccinated. The deaths from fowl typhoid in weeks after vaccination are recorded in Table IX.

With the exception of 3 pullets, all the deaths occurred in hens. One vaccinated pullet died 10 days after vaccination and 2 unvaccinated pullets died 9 and 38 days after vaccination respectively.

The act of vaccination was of considerable value in checking the deaths from fowl typhoid. The percentage death rate in the unvaccinated group was almost 8 times as great as that of the vaccinated group. The owner reported that there had been a check after vaccination and that the egg production was not very satisfactory.

Discussion

At the time of vaccination little was known about the state of the birds in the trial flocks with regard to fowl typhoid or other diseases, except where vaccination was deliberately performed during an outbreak. The birds were not blood tested before vaccination, but most of the flocks were situated in areas where fowl typhoid was endemic. Consequently the result of a blood test might have been of some value, especially when related to subsequent *post-mortem* examinations. There is no doubt that preventive vaccination was inadvertently performed during the early stage of an outbreak at some of the farms. Thus 23 unvaccinated birds died within the first 4 weeks after vaccination at the 7 farms where losses were relatively heavy. Their average age at the start of the trial was 4½ months and losses from fowl typhoid commenced when they were just under 5 months of age. The comparable ages for the 19 farms where losses were slight were 4 and 5 months respectively. This would suggest that vaccination should be performed at an age not greater than 4 months and possibly even earlier.

The results of injecting birds with a live vaccine during the throes of an outbreak is well illustrated by the results obtained at Farm A (Table VIII). During the first week after vaccination, 17 vaccinated birds died and only 4 unvaccinated ones. Similar but less dramatic results were obtained at the 25 farms where preventive vaccination was performed (Tables II and III). It is possible that some of the deaths might have been due solely to the vaccine employed, but this is unlikely, at least in the case of those birds vaccinated with 9R, since a smooth strain of organism was recovered in each case. It appears, therefore, that the vaccination of infected birds tends to precipitate death under certain circumstances. This finding in no way contradicts Williams Smith's experimental evidence (1956) that an immunity of an interference type occurs in birds vaccinated very early in the course of an infection, since there is no means of establishing the time at which birds become infected during the course of a natural outbreak. Indeed the precipitation of death by vaccination of infected birds is probably a good way of removing a nidus of infection from an otherwise healthy flock and might help to account for the few deaths from fowl typhoid which occurred at 18 farms (Table II). It must be conceded, however, that since both vaccines were living attenuated strains of *S. gallinarum*, recently vaccinated birds might have excreted the organisms in their faeces and passed the immunity on to the unvaccinated birds. This contingency is unlikely to be of much account, however, since Williams Smith (1956) demonstrated the presence of 9S in the faeces of only 4 out of 70 chicks during the first fortnight after vaccination and none at 3 weeks.

Bearing in mind that more vaccinated birds died from fowl typhoid directly after vaccination than unvaccinated ones, in those farms where preventive vaccination was undertaken, the final results show that the vaccines were of considerable value in reducing the losses from fowl typhoid. This is particularly reflected in the results obtained at the 7 farms where the losses were relati ely heavy and in the individual case of Farm 1 (Tables III and IV). Thus if we ignore the deaths which occurred during the first 14 days after vaccination, then the percentage death rates at the 7 farms were less than 1 per cent. in the group vaccinated with 9R, 1·7 per cent. in the group vaccinated with 9S and 11 per cent. in the unvaccinated group.

The comparable figures for Farm 1 are equally striking. None of the birds vaccinated with 9R died from fowl typhoid after the first fortnight, 4 per cent. of those vaccinated with 9S and 43 per cent. of the unvaccinated birds. It is noteworthy that at the time of the blood test and subs quent slaughter, 2 birds vaccinated with 9S and 7 unvaccinated birds were missing, although all the survivors of the group vaccinated with 9R were present. Foxes were active in the neighbourhood and it is conceivable that the missing birds were suffering from fowl typhoid and thus became an easy prey to these predatory creatures.

The results of the bacteriological examinations of the survivors at Farm 1 and Farm 2 (Tables V and VII) show that a high proportion of the vaccinated birds were harbouring a smooth strain of *S. gallinarum*. Some of the birds also showed pathological changes in the ovaries. Very early deaths from fowl typhoid occurred at both farms after the start of the trial and the immunity established in some of the survivors might have been of the interference type (Williams

Smith, 1956) although the possibility of infection with a field strain of *S. gallinarum* at any time after vaccination must also be borne in mind. Such birds may act as carriers of a virulent infection and should be isolated from susceptible stock. It is also possible that some of the vaccinated birds at Farm B (Table IX) were harbouring a field strain of *S. gallinarum* which would help to explain the poor egg production for a period as long as 9 weeks after vaccination. The management of the birds at this farm was reasonably good. At one farm where fowl typhoid had been diagnosed, the birds were treated with furazolidone before vaccination. The results were insufficiently clear cut to draw any definite conclusions, but this method of treatment followed by vaccination is worthy of further consideration especially where the disease is diagnosed in the early stages of an outbreak.

Viewing the results as a whole it is apparent that both vaccines were equally successful in reducing the death rate from fowl typhoid in the field and in those cases where the vaccines were employed in flocks free from disease, there was no check at the time of vaccination and the egg production of the birds was satisfactory.

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SEPARATION OF SPERM CELLS

Zoologists at the University of California have made a discovery which may prove of great importance in the field of artificial insemination. They have succeeded in separating male from female sperm cells by applying an electric voltage to the sperm.

It was found that the cells could be divided into 2 groups which swam in opposite directions, and when these cells were divided by the electric voltage, one group produced predominantly male offspring and the other predominantly female offspring. So far the experiments have been confined to rabbits, but if this discovery can be extended to farm animals its value to animal breeders is obvious.

Current Literature

BOOK REVIEWS

Veterinary Toxicology. By R. J. GARNER, M.A. (CANTAB.), M.V.SC., F.R.C.V.S., A.R.I.C. Baillière, Tindall & Cox. Pp. 415. Price 35s.

Though the title page of this book describes it as "Formerly Lander's Veterinary Toxicology" it is virtually a new book. Nevertheless it is pleasant to see in the historical page of the forematter that the 3 editions of Lander's Veterinary Toxicology are shown as the forerunners of this new book entitled simply "Veterinary Toxicology." Those familiar with Lander's Veterinary Toxicology are only too well aware of its great merits and value, but at the same time they realise that in the 12 years that have elapsed since the last edition appeared there have been far-reaching advances and changes in many spheres of veterinary toxicology.

Comparison of the new Garner's Veterinary Toxicology with the older Lander's Veterinary Toxicology leaves no doubt that the layout of the new is substantially different from the old, and that a very great part has been completely rewritten. The author has tackled his very substantial task in a most commendable way. In general it may be said that the text is lucid and reads well. The book is divided into 8 parts.

The introduction of 35 pages deals with the definition of a poison, classification, general chemistry, metabolism, mode of action, factors affecting action causes (sources), diagnosis and general treatment of poisoning. The introduction concludes with a brief discussion of *post-mortem* examination and chemical analysis.

Part 2 deals with mineral or inorganic poisons. This extends to 85 pages. The substances dealt with are arranged in alphabetical order, a system that facilitates use of this part for reference purposes.

Organic compounds are divided between parts 3, 4 and 5.

Part 3 of 63 pages deals with the toxicology of drugs. On this part the arrangement of the subject matter is less regular, some substances being found in their alphabetical order while others are grouped according to their therapeutic use. So some substances are grouped in relation to their action, while others are in juxtaposition to substances with which there is no common action.

Part 4 of 50 pages gives a concise and up-to-date description of the toxic action of pesticides. This part is divided into sections according to the use of the particular pesticide, *e.g.*, acaricides, fungicides, herbicides, insecticides, molluscicides and rodenticides.

Part 5 is concerned with a miscellaneous group of organic compounds. It extends to 16 pages and includes consideration of the chlorinated naphthalenes as a cause of hyperkeratosis and the poisonous properties of fuel oil. There is a brief reference to nitrogen trichloride and its effects in "agenizing" flour. The discussion on sewage poisoning is based on the work of Minett *et al.* which showed that continued consumption of water containing human sewage was without effect on cattle.

Part 6, poisonous plants, covers 92 pages. The

plants are arranged in order of their botanical classification. The botanical description of the plants and the line drawings which supplemented these descriptions in Lander's Veterinary Toxicology have been deleted ; it may well be that these botanical descriptions and line drawings were useful to many readers and their deletion will be regretted. This section suffers from the inclusion of too many plants, for some at last are of doubtful poisonous propensities.

Part 7 reviews the position in regard to radioactive materials and covers 10 pages. This part, though brief, is a most useful contribution to veterinary literature.

The 8th and last part of the book deals with toxicological analysis in 24 pages. It is emphasised that this part does not attempt to give a detailed description of the procedures involved, but rather aims at telling the reader what can be done and in that way should be of value in facilitating co-operation between the practising veterinary surgeon and the analytical laboratory.

There is a good index that stands up well to trial testing.

In preparing a volume of this kind no author can be expected to be completely familiar with every section of the material described. He is therefore dependent on the accuracy of his sources of information and may unwittingly be led into error. Thus on page 82 under the discussion on fluorine there is the statement. "Efficient trapping devices are being or have been fitted in many cases, particularly in the Fort William area." Unfortunately these devices have not proved efficient and those who are concerned with fluorine contamination around aluminium works in Australia, America, Scandinavia and Great Britain are only too well aware of the failure of the trapping devices to mitigate the nuisance. So far the most efficient of these devices have failed to trap more than 30 per cent. of the fluorine compounds escaping from the furnaces.

In general the text is substantially authenticated by references to literature and the labour in pursuing the large number of references quoted must have been considerable.

The book is well printed on clean paper which makes the text stand out well, and so is easy to read. The binding is attractive and appears adequately robust.

Very many veterinary surgeons will wish to possess this volume as a book of reference, veterinary undergraduates will find study of its pages an essential in their course on toxicology.

The author is to be congratulated on the manner in which he has accomplished a task the formidable nature of which is emphasised by the points of criticism raised in this review.

Drug Resistance of Micro-organisms. By R. J. SCHNITZER & E. GRUNBERG. Academic Press Inc., New York, 1957. Pp. xiv, 395. $10.00.

Although chemotherapeutic agents have been used intensively for only a comparatively short period in the history of medicine, the importance of the consequent emergence of drug-resistant strains of pathogenic micro-organisms has reached such dimensions as to warrant a gathering together of all the relevant information on the experimental, as distinct from the clinical, aspect of the subject. This book is the outcome and the authors have succeeded in presenting a critical, comprehensive and well referenced survey of the literature relating to the different aspects of experimental drug resistance as they apply to protozoa, spirochaetes, bacteria and fungi. The drugs studied are very much more numerous than those in common clinical usage.

The methods of producing resistant organisms, *in vivo* and *in vitro*, are fully described and compared, as are the attributes of these organisms. These include the manner in which they may differ from the parent culture, particularly in regard to their specific biological properties. The degree and duration of resistance, its experimental termination, and the additional state of drug dependence is also covered. One section is devoted to the actual mechanism involved in the production of drug-resistant organisms, and includes reference to the much argued subject of the relative importance of adaptation and mutation in this process, and this section also deals with such matters as the specificity of resistance and cross-resistance. A final section is concerned with phenomena, such as antagonism and synergism, which are related to drug resistance.

Although the authors state that, amongst others, this book has been written for students and clinicians, the reviewer considers that its main appeal will be to the specialist ; its use for student and clinician will probably be limited to reference to the experimental background of points that may arise during study or work.

Goat Husbandry. By DAVID MACKENZIE. Faber. 36s.

If you do not like goats, it is because they are often regarded as the devil incarnate ; they stink to high heaven, can devastate fertile areas, and have done so to great effect in the Mediterranean and Middle East, creating a desert ; they live on tin cans, waste paper, dust and rubbish in the roadside verges ; they do (in Malta at least) carry the germs of Malta fever, and at least in Britain are often regarded as the pet of a few peculiar maiden ladies ! These are the reasons put forward by the author of this very timely book—and many of us will probably agree that the diagnosis is near the mark. This book is, in large measure, an effort to correct these misunderstandings, and show how the goat can, if encouraged, play a valuable part in our agricultural economy.

The author, who is obviously an enthusiast (one might almost say a lover of the goat) must have spent a great deal of time amassing the information which is set forth. It is only to be expected from such an enthusiast that at times his eagerness encourages exaggeration in justification of the claims put forward for this undoubtedly unusual animal.

In every respect the goat would seem to be a more effectual animal than the cow ! The quality of its milk has many advantages ; it is less likely to suffer from mastitis—though not everyone would agree that this is because of the nature of the goat's diet as compared with that of the cow—billy goats will eat ergotised grasses with no ill effect, and it can be used to consume the organic wastes of certain industries such as that of the olive oil and tomato canning concerns. High fibre wastes of this sort, with which the pig cannot deal, find a place in the goat's diet.

As a panacea for many things, goat's milk is the answer, but do we believe that 25 per cent. of those who drink cow's milk suffer because of this from indigestion and insomnia, and that unhappy bottle-fed babies will be less querulous on goat's milk.?

There is still a lot of leeway to make up in our knowledge of diseases of the goat, but what information there is makes interesting reading, which perhaps is more consoling to the owner than the veterinary surgeon. Garlic (and also phenothiazine) is an effective vermifuge. A course of cobalt appears to be effective against acetonaemia. There is an excellent chart relating to the internal parasites of the goat provided for ready reference. It is doubtful, however, whether there is yet any evidence to show that the goat picks up its coccidia from rabbits, poultry or wild birds.

Practically every aspect of the goat is dealt with in a most informative and valuable manner, including breeding, nutrition with recommended standards, housing, diseases and general management. One cannot leave this book without a deep feeling that perhaps our opinions of the goat have, to date, been unkind, and justify revision. Not only has its milk special intrinsic qualities which one cannot deny, and which are discussed in a separate chapter by a doctor, but the goat itself, if appropriately managed, can produce meat, its kid can be eaten, it can provide leather or mohair, and the better specimens can be exported.

The book is a compendium and provides valuable reference for all those interested in this much maligned animal.

Biological Aspects of the Transmission of Disease. Edited by C. Horton Smith. Published for the Institute of Biology by Oliver & Boyd, Edinburgh, 1957. 21s.

It has been stated that one of the aims of the Institute of Biology is to break down the professional and specialist barriers that tend to hinder the exchange of views and knowledge which exist among workers on biological problems. Judged by this criterion, the symposium on the Biological Aspects of the Transmission of Disease was outstandingly successful, and this record of the proceedings is fascinating reading but difficult material for review. The scope of the subject was enormous, ranging from a paper on Fungal Diseases of Plankton Algae by J. W. G. Lund to the Transmission of Helminths of Veterinary Importance by E. L. Taylor.

Perhaps it is natural for a reviewer to seek some underlying theme by which the widely different subjects presented can be linked, and if one has a criticism it is the absence of a concluding paper that at least attempted the formidable task of surveying the field as a whole.

On reading these papers and the discussions on them, certain trends in thought seem to persist, firstly the stress on the adaptation of the biological mechanisms for the transmission of a disease to fit the particular set of circumstances concerned, and the tendency to postulate that evolutionary trends in this context are towards less antagonism between host and parasite, that is to say evolution is from virulence to commensalism. This latter view was contested in discussion, and whatever the individual viewpoint might be all would probably agree that change is more likely than a continuation of a stable relationship between host and parasite. C. H. Andrewes in his contribution, The Evolution of Some Animal Viruses, said much that was thought provoking in this connexion.

Although the intention of the organisers was to encourage workers to think in broad biological terms, it is inevitable that certain contributions will appeal to veterinary readers more than others. The following articles all have veterinary applications : The Dispersal of Fungi Pathogenic for Man and Animals (G. C. Ainsworth) ; Bacteria of Veterinary Importance and Their Transmission by Non-biological Agencies (R. Lovell) ; Factors Affecting the Transmission of Coccidia and the Development of Disease in Fowls (C. Horton Smith) ; The Transmission of Helminths of Veterinary Importance (E. L. Taylor) ; The Direct Transmission of Disease Between Two Organisms of the Same Species (R. Cruickshank) ; The Transmission of Viruses from Animals to Man other than by Arthropods (C. F. Barwell); The Transmission of Viruses to Vertebrates by Arthropods (G. W. A. Dick) ; The Transmission of Trypanosomes and its Evolutionary Significance (C. A. Hoare) ; The Evolution of some Animal Viruses (C. H. Andrewes) ; and Properties of Some Infective Agents in Relation to Their Modes of Transmission (W. I. B. Beveridge).

This book contains illustration after illustration of the complex biological patterns of disease transmission and time and again the example is a veterinary one.

To the making of books there is no end, and fresh books providing more and more facts come out almost daily. The book that jolts one's mind into thinking more widely and critically of the facts themselves is not so common.

This is such a book.

Eduard le Danois (Fishes of the World). Harrap & Co., Ltd. 63s.

The subject of this review cannot be said to have much bearing on the practice of the profession of veterinary surgery but of a certainty it must beguile the leisure hours of members of any profession. Admitting at once that the leisure hours of veterinarians are few it still remains true that a momentary glance at " Fishes of the World " must give pleasure. The book is copiously illustrated, both in colour and black and white, with excellent and unusual photographs. The accompanying text is intriguing, providing an entertaining mixture of information : zoological, geographical and even gastronomical. Some of the facts concerning life and growth of fish are most enlightening.

For those who find beauty in the shape of living things, this book is a most worthwhile addition to the library. Excellently produced, it is good value at 3 gns.—remember it when using any book tokens you may receive at Christmas; alternatively it may solve the problem of what to give as it is difficult to imagine anyone who would find no pleasure in such a gift.

News and Comment

THE HISTORY OF DOMESTIC ANIMALS

The University of London Department of Extra-mural Studies is holding a course of 12 University Extension Lectures on "The History of Domestic Animals" at the City Literary Institute, Stukeley Street, Drury Lane, W.C.2. The lectures will be held on Thursdays (6.30 p.m. to 8.30 p.m.), commencing January 9th, 1958.

Professor F. E. Zeuner, D.SC., PH.D., F.S.A., F.G.S., F.Z.S., will discuss the problem of domestication from the point of view of sociological evolution as well as from the economic angle of prehistoric man. A summary will be given of what is known of the history of the most important species, and of the archaeological and skeletal evidence available. The dog, sheep, goat, reindeer, cattle, pig, horse, elephant, camel, and cat will be treated in detail.

The fee for admission will be 8s. and applications for tickets should be made to the Principal, City Literary Institute, Stukeley Street, Drury Lane, W.C.2.

SHOOTING BUFFALOES

Mr. E. H. Holland writes from Jesselton, North Borneo:—

"It might be of interest to record the site for shooting buffaloes as the method used for cattle is not applicable. The obvious place to shoot a buffalo is (as for goats and horned sheep) from the posterior to the nucheal crest and forward towards the nose. In the dead specimen this is undoubtedly the thinnest part of the skull but, unfortunately, the size and backward sweep of the buffaloes' horns make it extremely difficult and dangerous for the operator to use this site. No doubt special methods of restraint would obviate the risk but they would make the method cumbersome.

"When trying the site on the frontal bone, the difference between the cows' and buffaloes' horns causes some confusion. The cow's horn is circular in cross section, but the buffalo has a flat surface in the same plane as the forehead which may measure as much as 6 inches across where the horn meets the head. A thick band of bone joins the base of the horns. In the mid-line the internal and external plates of the frontal bone are joined and supported by a pillar of bone.

"The site for shooting a buffalo is as follows. A line from the point where the posterior aspect of the flat of the horn meets the head to the outer canthus of the opposite eye is taken, and the point where this crosses the mid-line or the corresponding line from the other horn is selected. This is in the thickened boss of bone. The buffalo is then shot ¼ to ½ inch lateral to this point as a portion of the frontal sinus lies beneath. There appears to be no difficulty in penetrating to the brain at this point."

UNIVERSITY NEWS

University of Bristol Centaur Society

The 8th annual dinner of the Centaur Society (University of Bristol veterinary students) was held in the Queen's Hall of the Berkeley on Monday, November 18th.

The guest of honour, Dr. W. R. Wooldridge, was introduced by the Chairman of the Board of Veterinary Studies, Professor C. W. Ottaway, who spoke of the influence that Dr. Wooldridge and his late uncle, Professor G. H. Wooldridge, had had on the profession. In proposing the health of the Society and its President, Dr. Wooldridge recalled that he had been a member of the committee responsible for recommending that the University should provide a course of veterinary studies. He continued, in a humorous vein, by drawing attention to the importance of students enjoying the full facilities of a university.

Mr. G. W. Meadows, President, responded to the toast by outlining some of the activities of the Society and mentioned that the Association of Veterinary Students' Congress would be held in Bristol next term. The health of the guests was proposed by Mr. K. J. Betteridge, Secretary; he especially welcomed the Dean of the Faculty of Medicine and commented that the Society was proud to act as host to both the staff of the Veterinary School and to the local practitioners. In replying, the Dean, Professor A. V. Neale, described Bristol as presenting an excellent University in most of its aspects and believed that any barriers that existed between the human and veterinary medical professions should be and are being rapidly removed. Mr. W. D. Juby proposed the toast "Absent Friends."

After a brief interval, approximately 70 couples danced to the band of Arthur Alexander. The occasion, which officially ended at 1 a.m., was organised by Mr. L. M. Whittard.

FIFTY YEARS AGO

In view of the recent correspondence over a scale of professional fees readers may be interested in the following editorial article, which appeared in THE VETERINARY RECORD on November 30th, 1907.

Public Contracts

Mr. Willett, in his Presidential address to the Central V.M.S., referred to the tendency of some practitioners to undercut each other in tendering for contracts with Municipal and Borough Councils. The subject is an old one, but it is well to revert to it occasionally, for the evil can only be remedied by the individual action of members of the profession.

Undoubtedly it would be a good thing if local Councils could be induced, as Mr. Willett suggests, to advertise for veterinary surgeons at fixed salaries, in place of asking professional men to submit tenders. This would raise our public status in some respect, but it would not prevent undercutting being carried on in a more insidious form than its present one. It would not be difficult to acquaint a local Council with the fact that a veterinary surgeon was willing to do their work at a lower salary than they were paying at the time; and in all probability, in such a case, the appointment would speedily be re-advertised on reduced terms. The practice of

undercutting, in one form or another, will continue until the general feeling of the profession is strong enough to stop it.

As far as Municipal and Borough contracts are concerned, there is, of course, a very simple method of securing adequate remuneration for these. If all the practitioners of a town or district were to fix upon a reasonable sum, and mutually agree to accept nothing less, that sum would be forthcoming.

Only a few months ago we were able to note such a combination at Exeter, where 3 veterinary surgeons succeeded in fixing the medical attendance on the Corporation's horses at the quite fair annual rate of 15s. per head, only half that amount having previously been given. The same thing could probably be done in every locality where it is necessary—if practitioners would only unite to do it. Some private contracts, also, would be more lucrative than at present, if the same plan were followed. But many veterinary surgeons covet public local contracts in particular as a means of advertisement; and some, at least, will accept them at unremunerative terms on that account. These men may increase their own practices by such action, but they certainly injure the profession.

We shall never arrive at a complete uniformity of fees, but we can probably approach it more nearly in public contracts than in any other branch of general practice. That we do not do so is the fault of a few of our own members. The majority of us disapprove strongly of undercutting, and those who are known to systematically practise it are certain to lose favour among their colleagues. It is scarcely likely that it will ever disappear altogether, but it will certainly diminish as the feeling against it becomes stronger.

R.C.V.S. PHARMACOLOGY EXAMINATION

The successful candidates in the November, 1957, examination were Mr. T. D. Collins and Mr. S. H. McIver, both of Dublin.

R.C.V.S. OBITUARY

We record with regret the death of the following member of the profession:—

NORRIS, James Henry, North Mymms Vicarage, Hatfield, Herts. Late Director of Veterinary Research and Chief Veterinary Officer of Ireland. Graduated Edinburgh, May 22nd, 1897; died November 14th, 1957.

PERSONAL

Births

BROUGHTON.—On October 4th, 1957, to Jean, wife of John Edward Broughton, B.V.SC., M.R.C.V.S., of "The Cedars," Ringwood, Hants, a son, Paul Oliver.

CARTMELL.—On November 17th, 1957, to Joan, wife of W. B. Cartmell, B.V.SC., M.R.C.V.S., at The Lower House, Wickham, Fareham, Hants, a daughter, Louise Mary.

METIVIER.—On November 17th, 1957, to Jill (*née* Irwin Toronto), wife of Hugh Nye Metevier, M.A., M.R.C.V.S., of 53, Station Street, Swaffham, Norfolk, a son.

PERRETT.—On November 17th, 1957, to Maureen, wife of David R. Perrett, M.R.C.V.S., of Downend, Bristol, a daughter.

Dr. Ian Macadam of the Federal Department of Veterinary Research, Vom, N. Nigeria, has been awarded the Diploma in Bacteriology by the University of London.

Mr. Ian D. B. Newsam has been appointed to a senior research post in the Animal Health Research Laboratory of the Commonwealth Scientific and Industrial Research Organisation, Melbourne, Australia.

COMING EVENTS

December

3rd (Tues.). Meeting of the Lakeland Veterinary Association at the George Hotel, Keswick, 6 p.m.

4th (Wed.). 21st Anniversary Dinner and Dance of the Sussex Veterinary Society at the Regent Restaurant, Brighton, 7 p.m.

5th (Thurs.). General Meeting of the Central Veterinary Society at the Royal Veterinary College, Camden Town, N.W.1, 6 p.m.

Ordinary Meeting of the Ayrshire Veterinary Association in the Ailsa Lounge, Station Hotel, Ayr, 2.30 p.m.

6th (Fri.). General Meeting of the South Wales Division at the Park Hotel, Cardiff, 2 p.m.

Meeting of the Shropshire Veterinary Club at the Radbrook Hall Hotel, Shrewsbury, 8 p.m.

11th (Wed.). Ordinary General Meeting of the Sussex Veterinary Society at the Old Ship Hotel, Brighton, 2.30 p.m.

Annual General Meeting of the North Wales Division at the Gwydyr Hotel, Bettws-y-Coed, 2 p.m.

General Meeting of the Midland Counties Veterinary Association at the Swan Hotel, Stafford, 2.45 p.m.

Annual General Meeting of the Scottish Branch at the Royal (Dick) School of Veterinary Studies, Edinburgh, 2.15 p.m.

Meeting of the South-East Midlands Veterinary Medical Association at Franklin's Gardens Hotel, Northampton, 7.30 p.m.

19th (Thurs.). Annual Dance of the V.V.B.F. Ladies' Guild, Dumfries and Galloway Division, in the Cairndale Hotel, Dumfries, 8.30 p.m.

Ordinary General Meeting of the South-Eastern Veterinary Association at the Royal Star Hotel, Maidstone, 2.30 p.m.

January

8th, 9th and 10th (Wed., Thurs. and Fri.). R.C.V.S. Committee and Council Meetings.

22nd, 23rd and 24th (Wed., Thurs. and Fri.). B.V.A. Committee and Council Meetings in London.

FOOT-AND-MOUTH DISEASE

The areas described in the Schedules below are declared to be Infected Areas for the purpose of preventing the spread of foot-and-mouth disease:—

IN THE COUNTY OF KENT

The Borough of Royal Tunbridge Wells.

The Petty Sessional Division of Tonbridge.

In the Petty Sessional Division of Malling: The parishes of Wrotham, Trottiscliffe, Addington, Ryarsh, West Malling, Wateringbury, Teston, West Farleigh, Hunton, Yalding, East Peckham, West Peckham, Plaxtol, Ightham, Borough Green, Platt, Offham, Mereworth and Nettlestead.

In the Petty Sessional Division of Sevenoaks: The parishes of Westerham, Brasted, Sunbridge, Chevening, Riverhead, Sevenoaks Weald, Seal, Kemsing, Otford, Dunton Green and Sevenoaks.

In the Petty Sessional Divison of Cranbrook and Tenterden: The parish of Horsmonden and so much of the parish of Marden as lies to the west of the road running from Goudhurst via Winchet Hill, Marden, Milebush and Linton to Maidstone, excluding the said road.

IN THE COUNTY OF EAST SUSSEX

In the Petty Sessional Divison of East Grinstead: The parish of Hartfield and that part of the parish of Withyham as lies within the Petty Sessional Division.

In the Petty Sessional Division of Frant: The parishes of Crowborough, Rotherfield, Wadhurst and Frant and that part of the parish of Withyham as lies within the Petty Sessional Division.

IN THE COUNTY OF EAST SUSSEX

In the Petty Sessional Division of East Grinstead: The parishes of Worth, West Hoathly, East Grinstead and Forest Row.

In the Petty Sessional Division of Haywards Heath: The parishes of Slaugham, Balcombe, Ardingley, Horsted Keynes, Cuckfield Rural, Cuckfield, Lindfield, Lindfield Rural, Haywards Heath, Bolney, Wivelsfield, Twineham, Hurstpierpoint, Burgess Hill, Keymer, Clayton and Alborne.

In the Petty Sessional Division of Uckfield: The parishes of Danehill, Maresfield and Fletching.

In the Petty Sessional Divison of Lewes: The parishes of Newick and Chailey and so much of the parishes of East Chiltington, Plumpton, Streat, Westmeston and Ditchling as lies to the north of the road running from Lewes via Plumpton, Westmeston and Whitelands to Clayton, including the said road.

IN THE COUNTY OF WEST SUSSEX

In the Petty Sessional Division of Horsham: The parishes of Crawley, Rusper, Lower Beeding, Horsham, Nuthurst, Cowfold, and Shermanbury, the detached part of the parish of Horsham Rural and so much of the parish of Horsham Rural as lies to the east of the main road (A.24) running from Worthing to Horsham, including the said road.

IN THE COUNTY OF SURREY

In the Petty Sessional Division of Dorking: The parishes of Charlwood, Horley and Burstow.

In the Petty Sessional Division of Godstone: The parishes of Horne, Lingfield and Felbridge and so much of the parish of Nutfield as lies to the south of the railway running from Redhill to Godstone, excluding the said railway.

ADDRESSES OF DISEASE INFECTED PREMISES

The list given below indicates, first the county in which are situated the premises on which disease has been confirmed, followed by the postal address and date of outbreak.

Anthrax

Ches. Leigh Hall Farm, Little Leigh, Northwich (Nov. 18).

Dorset. Hope Farm, Netherbury, Bridport (Nov. 20).

Flints. Pentre Mawr, Newmarket, Dyserth (Nov. 19).

Lincs. Westfields Farm, Barkston the Willows, Grantham (Nov. 10).

Fowl Pest

Lancs. Blue Slates Farm, Ulnes Walton, Preston; Delamere, 4, Woodcock Street, Lostock Hall, Preston; Windyridge, Blue Stone Lane, Mawdsley, Ormskirk; Eskham, Southport Road, Eccleston, Chorley; Balshaw Farm, Leyland Lane, Ulnes Walton, Preston; Fernlea, Blue Stone Lane, Mawdsley, Ormskirk (Nov. 18); Billinge Hall Farm, Eccleston, Chorley; Willow Spring Farm, Southport Road, Eccleston, Chorley; Springlea Farm, Shaw Green, Euxton, Chorley; Smithy Farm, Much Hoole, Preston (Nov. 19); Johnsons Farm, Johnsons Lane, Tarleton, Preston; Fleetwood Hall Farm, Midge Hall, Preston; Post Office Farm, Eccleston, Chorley; Avondale, Shirley Lane, Longton, Preston; Porters Farm, Holker Lane, Ulnes Walton, Preston; Roemoor Farm, Southport Road, Eccleston, Chorley; Lower House Farm, Fox Lane, Leyland, Preston; Rose Hill Poultry Farm, Leyland Lane, Leyland, Preston (Nov. 20); Great Nelson Farm, Ulnes Walton, Preston; Sunnyside, Hall Lane, Longton, Preston; Mayors Farm, Grange Lane, Hutton, Preston; Wyredene, Stanah Lane, Thornton, Blackpool; 28, Blackgate Lane, Tarleton, Preston; Sunnyside, Hall Carr Lane, Longton; Culbeck Nurseries, Culbeck Lane, Euxton, Chorley; Barnfield, Liverpool Road, Hutton, Preston (Nov. 21); Moss Farm, Midge Hall, Preston; Ansville, Station Road, Midge Hall, Preston; Oxen House Farm, Midge Hall, Preston; Bates Farm, Bradley Lane, Eccleston, Chorley; Sherwood Bungalow, Alvestone Lane, Mawdsley, Ormskirk; Silver Trees, Skip Lane, Hutton, Preston (Nov. 22); Oak Cottage, Dowbridge, Newton, Kirkham, Preston; Primrose Cottage, Station Road, Little Hoole, Preston (Nov. 23); Blythewood, Southport Road, Ulnes Walton, Preston; Beechcroft, Town Lane, Much Hoole, Preston (Nov. 24).

Norfolk. The Elms, Wattisfield, Diss (Nov. 23).

Northants. 67, North Street, Stilton, Peterborough (Nov. 21).

Suffolk. 10, Palm Street, Walsham-le-Willow, Bury St. Edmunds (Nov. 20); 16, Palm Street, Walsham-le-Willow, Bury St. Edmunds (Nov. 21).

Swine Fever

Bucks. Hawkins Farm, Frieth Lane, Great Marlow, Marlow (Nov. 20).

Cambs. Silverleys, Longstanton Road, Oakington (Nov. 19).

Hants. Millstone Farm, Mincingfield Lane, Botley, Southampton; Willswood Farm, Woodlands, Southampton (Nov. 18).

Kent. The Beeches, Burlings Lane, Knockholt, Sevenoaks (Nov. 22).

Leics. Holly Farm, The Square, Littlethorpe, Narborough (Nov. 20).

Lincs. Long Drove, Thurlby Fen, Bourne (Nov. 18).

London. White Hart Pig Farm, White Hart Road, Plumstead, S.E.18 (Nov. 21).

Norfolk. Priory Farm, Sporle, Kings Lynn (Nov. 18); Bridge Farm, Little Hautbois, Norwich (Nov. 22).

Somerset. Glebe Farm, Tolland, Lydeard St. Lawrence, Taunton (Nov. 20).

Yorks. Coldharbour Farm, Buttershaw, Bradford (Nov. 18).

CORRESPONDENCE

The views expressed in letters addressed to the Editor represent the personal opinions of the writer only and their publication does not imply endorsement by the B.V.A.

The "Rights" of Animals

Sir,—In the *Catholic Herald* for November 15th there was a report of papers presented to a *Semaine des Intellectuels Catholiques* recently held in Lille. Professor Olivier Lacombe is reported as saying:—

"The Christian should be in tune with the Franciscan way of viewing animate and inanimate creation in a brotherly way. And may we not go further and conceive of a mysterious, indefinable, unpicturable 'recuperation' of the animal kingdom in the eschatological transfiguration of the cosmos, announced by St. Paul?"

The reporter remarks: "The eternal fate of our

pets preoccupies many people and they are often laughed at for it. Here at any rate is a suggestion from a learned Catholic professor at an important Catholic conference." Many people outside the Roman communion will be grateful to Professor Lacombe.

Yours faithfully,
PETER D. TURNER.

Cave Cottage,
Oakridge Lynch,
Stroud,
Glos.

November 20th, 1957.

Sir,—If, as some hold, animals are utterly extinguished at physical death, all the more reason why we should make their brief span of life as pleasant as possible; since they go into eternal night let their daytime at least be gay. To take the view that, if animals are immortal, we should for that reason treat them better, is illogical. Surely it is not nearly so necessary to do so if we accept this latter view; for, no matter how we treat them, they will ultimately find full redress beyond our whim and control. Unless, of course, we are haunted by the suspicion that we may meet with them in the after-life and stand in judgment before them. Oh! dreadful thought; a vengeful throng of " dressed " tom-cats, docked puppies, and sterilised bitches waiting, in gleeful anticipation, to pay each one of us back in kind!

But to be serious now. If we accept the idea of purpose and design as against purposelessness and chaos in the universe, we must also accept that design and purpose throughout the whole universal structure; not only in our own lives or even that of the " higher animals," but in the whole edifice of creation—down to the simplest form of life and the meanest molecule. Any other view makes nonsense of our contention that we ourselves are part of a planned, rational universe. You cannot have sublime design and purpose at the top and blind, indiscriminate chaos at the bottom. Either the whole edifice is charged through and through with design and purpose or no part of it is so charged.

Reflecting along these lines, some great poets and thinkers have arrived at the conviction so surely expressed by Tennyson:—

" That nothing walks with aimless feet,
That not one thing shall be destroyed,
Or cast as rubbish to the void."

Sufficient here to say that if life, whether human or animal, is part of the created universe, it is—even in its most insignificant forms—ultimately indestructible. Its outward form and substance may change and decay, but the essence of the creature, which gave it individuality, the spark that lighted its conscious being, will not perish, indeed cannot perish, save with the perishing of the universe itself.

One correspondent wonders if immortality is to be conferred on animals in England. The power to confer immortality or inflict mortality on any creature, great or small, is, happily or alas, not ours to wield. In the last analysis, all living things stand at the receiving end; and we too are, willy-nilly, in the profession.

Yours faithfully,
DONALD BAIN.

The Bungalow,
Oldmeldrum Road,
Newmachar,
Aberdeenshire.

November 24th, 1957.

The Space Dog

Sir,—I have watched the correspondence columns of THE RECORD for the last two weeks for views of your readers on the question of Little Lemon in Sputnik II. Silence very often indicates condonation, although I feel quite sure that the large majority of British veterinary surgeons can feel nothing less than the utmost disgust and abhorrence at the way in which the dog was treated. It seems to me that our profession should register its emphatic disapproval of the use of animals—either dogs or monkeys—under such very unnatural conditions. In this case the dog was in utter darkness, quite unable to move in any direction, with wires attached to various parts of its body, forced to defaecate and urinate presumably in a container beneath him, for a whole week.

And what if the Sputnik oscillated? The Russians declared the dog had been trained to this mental cruelty, and that others were being trained. So we understand that such a nerve-shattering experience is being imposed not only on one dog but many dogs over and over again. Apparently all this is to glorify the Russian scientist, for I cannot see what useful purpose can be served by ascertaining whether a living creature can survive in outer space.

I do not know, but I have heard that there is no atmosphere on the moon capable of sustaining life; that it is devoid of vegetation, and that it is too cold to permit of any. Even if man could reach the moon what useful purpose would it serve? And how would he be propelled back again to earth? The whole conception seems, to my mind, childish and unworthy of the expenditure of vast sums of money (which could be put to far greater use on earth), or the perpetration of mental and perhaps even physical cruelty upon defenceless animals.

If the Russians wish to penetrate the mysteries of outer space, why not send up the people they have already condemned to death, with the promise that if they ever survive their crimes shall be excused?

If there are volunteers for such a service among those who have been sentenced for murder, then by all means let them go up—of their own free will; but I deprecate imposing our will upon any living creature which is given no choice but that of terrifying, slow death.

Yours faithfully,
HAMILTON KIRK.

28, Park Hill,
London, W.5.

November 21st, 1957.

Foot-rot in Sheep

Sir,—In your issue of November 16th you refer to the use of formalin and of chloramphenicol in the treatment of foot-rot in sheep. Any review, however brief, of modern treatment of this disease is surely incomplete without reference to oxytetracycline.*

In view of pressure on your space I mention one authority only—the report by Harriss in *The British Veterinary Journal* (May, 1955) on the highly successful and now well-known trials carried out at Porton Down, using terramycin ointment.

In his summary Harriss reports: " The application of terramycin in the form of an ointment . . . was found highly effective against the common form of foot-rot in sheep. The cost is estimated at about 2½d. *per sheep* at each application." (My italics.)

In the body of his report Harriss also makes the following point: " The use of an ointment instead of a tincture presents certain advantages. Under practical conditions the ointment in tube form is unspillable and easily portable. When applied to the foot it is less likely to suffer dilution by water and mud than a tincture, while it is more likely to act as a barrier between moisture and the sensitive tissues of the foot. Its application requires no brush or other instrument."

Yours faithfully,
ALAN HUET OWEN.

Pfizer Ltd.,
137-9, Sandgate Road,
Folkestone,
Kent.

November 19th, 1957.

* Terramycin.

Tranquillisers

Sir,—I was interested to read in your issue dated November 23rd the letter written by Mr. Hodgman on the use of 10(N-methyl-3-piperidyl-methyl)-phenothiazine* as a tranquilliser. I have also used this drug in practice and found it excellent for the relief of those conditions in the dog which cause acute irritation. In particular, I have found its use after an aural resection allows dressings to be safely dispensed with at an early stage. I find, however, that quite a high dosage is required, for instance a dog weighing 20 lb. requires 50 mg. three times daily. I have had good results in cases of pseudo-pregnancy in the bitch, chronic epilepsy, and pedal eczema, but have not found its sedative action sufficient to allow a vicious dog to be safely handled. I am indebted to William R. Warner and Co. Ltd., Eastleigh, Hampshire, for trial supplies of Pacatal.

Yours faithfully,
MICHAEL YOUNG.

43, The Mall,
Ealing,
London, W.5.

November 24th, 1957.

* Pacatal.

Sir,—The merits of 10-(N-methyl-3-piperidyl-methyl)-phenothiazine* mentioned in the letters of Mr. Oliver Jones and Mr. S. F. J. Hodgman as a tranquilliser can certainly be substantiated, and it is undoubtedly a drug of great usefulness.

However, whilst I will not attempt to comment on Mr. Jones's letter, as I have no experience whatsoever of wild zoo animals, I do feel it may be of interest to point out that in nervous and vocal dogs brought into strange kennels I have had excellent results with the use of benactyzine hydrochloride.†

The great merit in ordinary practice of this drug is its economical price compared with many other tranquillisers. I find that a dosage of 1 mg. 8-hourly is sufficient to eliminate the desire of most cocker spaniels to make a nuisance of themselves when in strange quarters, and have noticed no undesirable side effects even with larger doses, apart from a slight sleepiness during the first 24 to 48 hours administration. I also used Nutinal successfully around November 5th on a number of dogs and found it adequate to alleviate the symptoms of undue nervousness to fireworks.

I am indebted to Boots' Pure Drug Co. Ltd., Nottingham, for a supply of Nutinal.

Yours faithfully,
F. L. DAVISON.

63-65, Ilkeston Road,
Nottingham.

November 25th, 1957.

* Pacatal.
† Nutinal.

DISEASES OF ANIMALS ACT, 1950—GREAT BRITAIN
Summary of Returns of Confirmed Outbreaks of Scheduled (Notifiable) Diseases

Period		Anthrax	Atrophic Rhinitis	Foot-and-Mouth	Fowl Pest	Sheep Scab	Swine Fever
16th to 31st October, 1957		7	—	23	76	—	45
Corresponding period in	1956	22	1	1	46	—	20
	1955	50	1	—	40	—	42
	1954	20	—	—	15	—	43
1st January to 31st October, 1957		277	7	117	744	—	809
Corresponding period in	1956	1,183	11	128	603	—	650
	1955	630	6	6	465	—	1,224
	1954	257	4	12	630	—	1 245